1 **PROCESS**
2 .Printing plate (e.g., stereotype, etc.) forming
3 ..Utilizing pressure application
4.1 .With measuring, testing, inspecting, or condition determination
451 ..Of continuous or semicontinuous casting
452 ...And regulating an operation
453 ....Pouring
454 ....Product withdrawing
455 ....Cooling
456 ..During foundry sand treating or mold making
457 ..During feeding of metal to mold
458 ..During cooling of mold
5 .Including recycling of process material
6 .Shaping a forming surface (e.g., mold making, etc.)
7.1 ..Utilizing a vacuum during shaping
7.2 ...To apply consumable shielding film to shaping surface
8 ..Utilizing a frozen mercury pattern
9 ..Final product part or material, utilized in forming or included in shaping member
10 ...Utilizing plural preform bodies
11 ....Preform body embedded in or held by core member
12 ..Setting or hardening shaping surface by igniting mold surface or by utilizing a forced gaseous medium
13 ..Shaping plate type pattern
14 ..With subsequent coating of casting surface with cast product treating or release material
15 ..Shaping fluent material to form mold
16 ...Chemically reactive gas hardening of forming material
17 ...Shaping forming surface by mechanically removing material therefrom or subdividing forming surface to provide plural parts
18 ...Forming discrete molds sequentially
19 ...By spraying or slinging material against shaping surface
20 ....Particulate solid material
21 .....Resin containing
22 .....Employing compressed air as ram or piston to force sand against shaping surface
23 ...Composite, plural part or multilayered mold
24 ....Sequentially forming mold portions on same shaping member
516 .....Utilizing aqueous slurry material
517 ......With particular material for treating or perfecting casting
518 ......With particular binder
519 ......With particular refractory material
27 ....Shaping plural separable mold parts
28 .....Including shaping core member
29 .....Cope and drag sections
30 ....Positioning or maintaining position of core relative to the mold
31 .....Utilizing plural cores
32 ......Maintaining cores in spaced relationship within single cavity
33 ....Lining mold surface
34 ...With destruction of pattern to disassociate
35 ....Extracting pattern in liquid state
36 .....Utilizing fluent extracting medium
37 ...By compacting material against shaping surface
38 ....Diverse pressure applications
39 ....Vibrating or jolting during shaping
40 ....Utilizing pattern as compacting member
520 ...Utilizing particular mold materials
521 ....Self-hardenable molding material
522 ....Water soluble mold material
523 ....To perfect casting surface
524 ....To prevent casting oxidation

525 ....Particular binder material
526 .....Resin containing
527 .....And inorganic material
528 .....Inorganic material
529 ....Particular refractory material
44 ...Including pattern withdrawal
45 ..Pattern making
46 .Disposition of a gaseous or projected particulate molten material on a shaping surface
47 .Shaping liquid metal against a forming surface
459 ..Continuous or semicontinuous casting
460 ...Including product cutting or breaking
461 ...Forming a composite article
462 ...Forming filament, wire, or ribbon
463 ....Utilizing continuously advancing surface
464 ...Forming a hollow article
465 ....Using a core or mandrel
466 ...Utilizing magnetic force
467 ....Molten metal shaped by electromagnetic field
468 ....Applying electromagnetic stirring force to molten metal within mold or product
469 ...Utilizing electric arc or electron beam melting
470 ....Electric arc melting with slag or flux
471 ...Utilizing induction heating
472 ...Including lubricating of mold surface
473 ...Incorporating additional material or chemically reactive agent
474 ...Utilizing a vacuum
475 ...With inert or reducing gaseous atmosphere
476 ...With metal working
477 ...With diverse treatment
478 ...Having mold or product vibration or reciprocation
479 ...Having continuously advancing shaping surface
480 ....Utilizing roll couple mold
481 ....Utilizing endless plural belts
482 ....Utilizing wheel-band mold
483 ...Starting up or ending casting process
484 ...Specific product withdrawal
485 ...Specific mold or product cooling
486 ....Directly applying liquid coolant to product
487 .....Direct chill casting
488 ...Specific molten metal dispensing
489 ....Including flow stream deflection or other than vertical dispensing
490 .....Dispensing into horizontal mold
491 ...Adjusting mold size
48 ..Direct application of electrical or wave energy to work
492 ...To electrically heat work material
493 ....By electrical induction
494 ....By electron beam
495 ....By arc discharge
496 .....Composite article forming
497 .....With application of slag or flux
498 ...Utilizing magnetic energy
499 ....For stirring molten metal
500 ....In transporting molten metal
501 ...Utilizing sonic or supersonic wave energy
53 ..In situ reactive heating
54 ...Composite article forming
55.1 ..Incorporating addition or chemically reactive agent to metal casting material
56.1 ...To scavenge
57.1 ...Adding metal-containing material
58.1 ....To produce casting having nonhomogenous composition
59.1 .....Utilizing preform body
61 ..Utilizing a vacuum
62 ...Applying diverse pressure
63 ...To transport casting material to mold (e.g., vacuum forming, etc.)
65 ...During introduction to metal
66.1 ..Applying an inert or reducing gaseous atmosphere to work
67.1 ...Atmosphere effected by chemical reaction

68.1 ...While melting casting material
69.1 ..With step of subdividing or removing material from product or preform (e.g., cutting, mechanically or by heat; sandblasting; chemical milling; etc.)
70.1 ...With product trimming, cutting, or breaking prior to removal from mold
71.1 ..With vibratory treatment of casting material
72 ..Coating mold surface with a treating agent
74 ...Gas producing coating
75 ..With coating of preformed workpiece
76.1 ..Combined
77 ..Slush casting type
78 ..Incorporating product dividing member
79 ..Employing a pore producing agent
80 ..Casting metal introduced into mold as a solid
81 ..Utilizing a liquid shaping surface
90 ..Forming product having interconnected movable parts
91 ..Composite article forming
92.1 ...Repairing or restoring article for use
93 ...Co-molding diverse metals utilizing removable or fusible partition
94 ...Sequential casting to form single product
95 ....Different metals
96 .....Metals simultaneously molten
97 ...Incorporating particulate material
98 ...Shaping metal and uniting to a preform
99 ....Co-molding diverse metals
100 ....Including preconditioning preform
101 .....Chemical treatment
102 ......By fluxing
103 .....Preheating
104 ......Utilizing a liquid heat transfer agent
105 .....Of preform in mold
106 ....Cast metal reshapes preform
107 ....Preform utilized to affect cast metal (e.g., to chill, to cap, etc.)
108 ....Uniting plural preforms or spaced preform portions
109 .....Stacked planar lamina preforms
110 .....Discrete contacting preforms
111 ....Preform particularly provided with means to provide interlock with cast metal
112 ....Positioning or maintaining position of preform relative to mold surface
113 ..Pressure forming
114 ...By centrifugal force
115 ....Plural constant speeds
116 ....Tilting of axis of rotation
117 ....Axially progressive casting
118 ....Positive heating or cooling of mold
119 ...By direct fluid pressure
120 ...Pressure applied after introduction of metal
121 ..Preconditioning of apparatus
122 ..Controlling solidification (other than ambient cooling)
122.1 ...Unidirectional solidification
122.2 ....Single crystal formation
123 ...By application of insulation to melt surface
124 ...By direct application of flame or gas
125 ...Localized or zone heat dissipation
126 ....By utilizing a cooling liquid
127 ....By utilizing a chill member
128 ...By utilizing a cooling liquid
129 ..Forming plural articles
130 ...Sequentially
131 ..Removing article from forming surface
132 ...Core removal
133 ..Introduction control or manipulation of charge
134 ...Separation of unwanted component from melt
135 ...Charge introduced as a plurality of streams
136 ...By movement of mold, charger, or part thereof
137 ..Assembling of mold parts
138 ..Utilizing particular shaping surface material

139 **APPARATUS FOR CASTING PRINTING PLATES (E.G., STEREOTYPE, ETC.)**
140 .Including means for severing or trimming product while associated with mold
141 .Including melting chamber
142 ..Having valved gate
143 ..Having pressure changing means
144 .Including positive mold heating or cooling means
145 .Including stripping means
146 **INCLUDING MEANS TO DIRECTLY APPLY MAGNETIC FORCE TO WORK OR TO MANIPULATE OR HOLD SHAPING MEANS**
147.1 .By electromagnetic means
502 ..In continuous casting apparatus
503 ...Electromagnetic mold
504 ...Electromagnetic stirring means
148.1 ..For holding or assembling shaping parts
149 **MEANS LUBRICATING RELATIVELY MOVING AND CONTACTING APPARATUS PARTS**
150.1 **WITH SIGNAL, INDICATOR OR INSPECTION MEANS**
151 .Pressure indicating means
151.1 .Including speed sensor
151.2 .Including position or spatial dimension sensor
151.3 ..Melt level sensor
151.4 .Including thermal sensor
151.5 ..For detecting or predicting breakout of continuous casting strand
152 **WITH SAFETY CONTROL MEANS**
153 .Apparatus safety means
154.1 **CONTROL MEANS RESPONSIVE TO OR ACTUATED BY MEANS SENSING OR MEASURING A CONDITION OR VARIABLE (I.E., AUTOMATIC CONTROL)**
155.1 .Control of feed material enroute to shaping area
155.2 ..Responsive to material level
449.1 ...In continuous casting apparatus
450.1 ....Including sensor comprising electrode or float
450.2 ....Including radioactive sensor
450.3 ....Including thermal sensor
450.4 ....Including optical sensor
450.5 ....Including magnetic sensor
156.1 ...Including electrode or float sensor
155.3 ..Responsive to pressure
155.4 ..Responsive to position or spatial dimension
155.5 ...Responsive to rate of change
155.6 ..Responsive to thermal condition
155.7 ..Responsive to weight
413 .Control of product withdrawal means in continuous casting apparatus
414 .Control of coolant applied to continuously cast product
154.2 .Responsive to position or spatial dimension
154.3 ..Responsive to rate of change
154.4 ...Continuous casting
154.5 ..Continuous casting
154.6 .Responsive to thermal condition
154.7 ..Continuous casting
154.8 .Responsive to pressure
157 **WITH CONTROL MEANS RESPONSIVE TO INDEPENDENT TIMING MEANS**
158 **WITH POSITIVE CLEANING MEANS FOR APPARATUS**
159 **MEANS TO SHAPE A FORMING SURFACE**
160.1 .Including means applying vacuum directly to mold material
160.2 ..And means to apply consumable shielding film to shaping surface
161 .Including means for sweeping or cutting forming surface
162 ..Means for shaping sprues or risers
163 ..Including rotating core bar
164 ..Rotatable pattern
165 .Shell type mold making machine
166 ..Including plural distinct forming stations
167 .And separate metal casting means
168 ..Including means for assembling shaped mold parts
169 .Including means for compacting particulate fluent mold materials
170 ..Flexible or deformable pressure means
171 ...Utilizing contiguous or independent diaphragms
172 ..Plural rammers
173 ...Fluid pressure actuated means
174 ..By die expressing
175 ..By centrifugal means
176 ..Pipe mold type forming means

177 ...By moving pattern to effect shaping
178 ....Rotating
179 .....Bead forming type
180 ..Having means for withdrawing forming surface from shaping means
181 ...Withdrawing station downstream of compacting station
182 ...Means withdrawing pattern plate intermediate cope and drag member
183 ...Having means for inverting pattern, flask, or shaping member
184 ....Means rotating press head and mold support
185 ....Rock-over type machine
186 ...Core making machine
187 ...Pattern member acting as compressing member
188 ....Including stripping plate
189 ...Utilizing vibrating means
190 ...Stripping plate
191 ...Drop pattern plate or support
192 ..Including means for feeding material by gravity
193 ...Means for delivering measured charge
194 ...Distinct feeding and compacting stations
195 ..Diverse means for applying pressure forces
196 ...Vibrating and squeeze type
197 ....Integral vibrator and squeeze head
198 ..Sand slinger type compactor
199 ...With boom-mounted slinging means
200 ..Blow type compactor
201 ...Including means for relatively moving blow means into engagement with shaping member
202 ...Including foraminous blow discharge means
203 ..By vibrating means (e.g., jarring, jolting, etc.)
204 ...Including cooperating static rammer means
205 ...Roll or rock-over type machine
206 ...By fluid actuated vibrator means
207 ..Press type compactor
208 ...Roller compacting means
209 ...Having invertible table
210 ...Plunger coacting with successively presented molds
211 ...Including a swinging press head
212 ...Fluid pressure means reciprocating or oscillating mold shaping member
213 .Including means for separating forming surface from shaping means
214 ..Means effecting parallel draw of cope and pattern plate respectively from each other and the drag
215 ..Means rotatably withdrawing pattern
216 ...Screw thread pattern
217 ..Utilizing a stripping plate
218 ...Pattern withdrawn vertically downwardly
219 ....Means effecting parallel motion
220 ....Including a mold material supporting stool
221 ....By lever and link
222 ..Including pattern having relatively moving parts
223 ..By vibrating means
224 ..Having means to invert flask or pattern
225 ..By drop pattern plate or support
226 ..By pin lifting arrangement for contacting mold
227 ..Means for displacing mold part from stationary shaping member
228 .Means for shaping core (e.g., core boxes, core molds, etc.)
229 ..Including character forming member (indicia)
230 ..Including means positioning preform part for forming composite core member
231 ...Preform part to be incorporated in cast product
232 ..Detachable or movable member for producing a recess or cavity in core member
233 ..Hinged core box sections
234 ..Including vent or vent forming means
235 .Pattern
236 ..Insert or chill supporting
237 ..Including flask member

238 ...Pattern or pattern holding member supported by aperture in flask or flask member
239 ...Pattern plate
240 ....Rotatable or pivotal pattern plate
241 ..Pattern plate
242 ...Gated pattern
243 ...Pattern mounted on both sides of plate
244 ..Sprue, gate or runner
245 ..To produce undercut
246 ...Destructible type pattern
247 ...Rotatable or pivotal pattern or pattern section
248 ...Loose piece type
249 ..Composite or plural part
250.1 **MEANS TO DIRECTLY APPLY ELECTRICAL OR WAVE ENERGY TO WORK**
505 .In continuous casting apparatus
506 ..Electron beam melting means
507 ..Induction heating means
508 ..Arc electrode melting means
509 ...Electroslag remelting type apparatus
510 .Electrical discharge knockout means
511 .High frequency vibration means
512 .Electron beam melting means
513 .Induction coil means
514 .Arc electrode
515 ..Electroslag remelting type apparatus
253 **MEANS TO APPLY VACUUM DIRECTLY TO WORK OR TO HOLD OR MANIPULATE SHAPING MEANS**
254 .Means applying vacuum or suction directly to molten casting material
255 ..Through porous mold body
256 ..Enclosed system including a receptacle and mold
257 ...Vacuum or suction means for feeding molten metal into charging chamber receptacle
258 ...Including melting chamber receptacle
259 **MEANS PROVIDING INERT OR REDUCING ATMOSPHERE**
415 .In continuous casting apparatus
260 **INCLUDING VIBRATOR MEANS**
416 .In continuous casting mold
261 .Fluid pressure type
262 **WITH PRODUCT SEVERING OR TRIMMING MEANS**
263 .Associated with continuous casting means
264 .Gate member acting as severing means
265 .Punch out type gate severing means
266 **WITH METAL REFINING MEANS**
267 **WITH COATING MEANS**
268 .Associated with a continuous or semicontinuous casting means
269 **WITH MEANS FOR HANDLING EXPELLED CAST PRODUCT**
270.1 **COMBINED**
417 .Including continuous casting apparatus
271 **MEANS TO SHAPE METALLIC MATERIAL**
272 .Metal revolving or tumbling type shaping means
418 .Continuous or semicontinuous casting
419 ..Including means to convey preformed product part to mold
420 ..Plural distinct shaping outlets
421 ..Hollow casting
422 ...Rotary mold
423 ..Filament or wire casting
424 ..Including shape-perfecting means
425 ..Including starter bar
426 ...Disconnectable
427 ..Continuously advancing mold part
428 ...Roll couple mold
429 ...Endless shaping means
430 ....Articulated segments (e.g., caterpillar type, etc.)
431 .....With plural belts of flexible material
432 ....Plural belts of flexible material
433 ....Casting wheel and flexible band
434 .....With dispensing feature
435 ..Having deformable mold wall or thermal expansion compensating means
436 ..Adjustable mold size
437 ..Including means to dispense or distribute metal charge
438 ...Movable dispenser
439 ...Mold contiguous with or within dispenser

440 ....Dispensing into horizontal mold
441 ..Including product supporting or withdrawal means
442 ...Roller
443 ..Having casting material cooling means
444 ...Direct cooling of material
284 .Pressure shaping means
285 ..Including a pressure gas or pressure vapor generator
286 ..Centrifugal casting means
287 ...Having balancing means
288 ...Including means to hold or position preformed product part
289 ...Having mold radially disposed from axis of rotation
290 ....Plural mold cavities
291 ...Having mold expansion or warpage compensator
292 ...Having mold or mold part clamping means
293 ....Centrifugally actuatable
294 ...Including brake means
295 ...Including means to remove product from mold
296 ...Having plural mold cavities
297 ...Having coolant applying means
298 ...Horizontal or near horizontal axis of mold rotation
299 ....Including axial feeding trough
300 .....Rotatable around axis
301 .....Movable along axis during feeding
302 ..Including core means
303 ..Injection type
304 ...Including valved mold gate
305 ...Including means to vent die cavity or gate
306 ...Direct pneumatic charging means
307 ....Manually operated pressure generator
308 ....Flask sealing cap contains a pressure conduit
309 ....Hot chamber type
310 .....Including means to segregate a charge
311 ......Front loading nozzle
312 ...Piston-cylinder charger
313 ....Opposed piston injector
314 ....Hydraulic piston pressure means
315 .....Having multi-way valve control unit
316 ....Hot chamber type
317 .....Piston contains injection conduit
318 .....Fluid actuated piston
319 ..Inelastic compression means for confined metal
320 ...Core or internal compression member
321 ...Fluid pressure actuated
322 .Plural independent molds
323 ..Including mold translocating means
324 ...Endless serial mold circuit
325 ....Rotating table or wheel type translocating means
326 .....Having a vertical axis of rotation
327 ......Mold have separable part
328 .......Including cam means to control assembly or disassembly of parts
329 ....Chain conveyor
330 .....Molds having separable parts
331 .....Including mechanical ejector for product
332 .Including means to hold or position preformed product part in shaping area
333 ..Means for positioning plural preforms
334 ..Means other than mold surface supports preform
335 .Including ladle or crucible type melt receptacle
336 ..Rotatable with mold or dipper type dispenser
337 ..Having flow control or conduit means intermediate the receptacle and mold
338.1 .Including means to heat mold
338.2 ..In situ chemical reactive heating means
339 .Including means to assemble mold parts
340 ..Core positioning means
341 ..Having auxiliary means for locking assembled parts in place
342 ..Permanent mold parts
343 ...Fluid pressure means actuator
344 .Including means to eject or separate product from shaping surface

345 ..Means to remove core
346 ...Sectional or plural part core
347 ..Utilizing ejector pin means
348 .Including means to apply coolant to mold or casting
349 .United particle type shaping surface (e.g., sand, etc.)
350 ..Mold having individual mold cavities for forming plural products
351 ...Including core in at least one cavity
352 ..Including metal chill
353 ...As part of shaping surface
354 ....Chill is a core or core part
355 ....Plural spaced chill sections
356 ....Hollow annular center section chill (i.e., ring)
357 ...Consumable chill
358 ..Including apertured strainer means for separating unwanted component from casting material
359 ..Including means to compensate for shrinkage (e.g., shrink head, etc.)
360 ...Blind riser
361 ..Shell type mold
362 ..Having means to restrict turbulence of flow during casting
363 ..Bottom gate or side pouring mold
364 ..Comprised of separable parts
365 ...Including a core
366 ....Having embedded sand reinforcing, aligning, or supporting component
367 .....Hollow component
368 ....Plural cores or core having plural parts
369 ..Core
370 ...Having integral alignment means
371 .Chill, shaping type
372 ..Vented
373 ..Circular
374 **FLASK OR FLASK SECTION**
375 .Including roll or rock-over means
376 .Investment type (e.g., dental, etc.)
377 .Size adjustable
378 ..Height adjustable
379 .Including means to retain or reinforce mold sand or to position reinforcement
380 ..Sand strip
381 ...Mechanically retractable
382 ..Depending reinforcement (e.g., gagger, etc.)
383 ..Flask wall surface construction retains sand
384 .Plural part flask or flask section
385 ..Including guide means to align superposed flask sections
386 ...Including locking means to prevent vertical displacement
387 ...Within and surrounded by flask wall
388 ...Guide means is adjustable or elastic
389 ....Resilient or flexible guide means
390 ....By bolt movable in a slot
391 ...Hinged type superposed sections
392 ..Having separable sides (e.g., snap-type, etc.)
393 ...At least one side joint hinged
394 **MOLD JACKET OR SLIP BOX**
395 .Having size adjustment feature
396 ..Self adjusting type
397 **CORE CENTERING OR SUPPORTING MEANS**
398 .Chaplet
399 ..Having anchor means
400 .Collapsible or knock down type core bar
401 **STRIPPER OR EJECTOR**
402 .Including means for inverting pattern
403 .Fluid actuated pattern stripping means
404 .Means to separate cast product from shaping surface
405 ..Ingot strippers
406 ...By stripping pin projecting through bottom of mold
407 ...Means moving mold vertically upwardly during stripping
408 ....Fluid pressure type stripper
409 **MEANS TO INVERT A PATTERN PLATE OR A MOLD (E.G., TURN-OVER DEVICE, ETC.)**
410 **VENT OR VENT FORMING APPARATUS**
411 **REINFORCEMENT FOR MOLD MATERIAL**
445 **STARTER BAR**

446 .Disconnectable
447 **PRODUCT SUPPORTING OR WITHDRAWAL MEANS FOR CONTINUOUS CASTING APPARATUS**
448 .Roller
412 **MISCELLANEOUS, APPARATUS**

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